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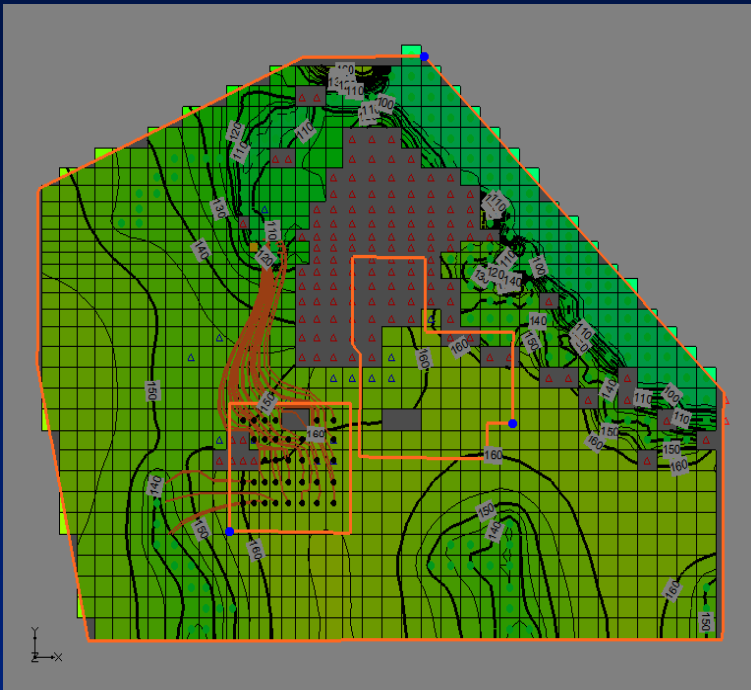
Radiation Protection and Nuclear Materials Subcommittee Meeting:

**ISG-013: “Assessing the Consequences of an
Accidental Release of Radioactive Materials
from Liquid Waste Tanks”**

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Overview



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- Introduction
- Issues & Basis for Update
- Overview of Proposed ISG
 - Failure and release mechanisms
 - Mitigating design features
 - Radioactivity source term
 - Ground or surface water transport
 - Exposure scenarios
 - Acceptance criteria
 - Specifications on tank concentrations
 - Evaluation findings of COLA reviews
- Area of Review & Interface
- Resolution and Applicability

Introduction (1/2)

- Why Is This IGS Needed?
 - Current guidance is internally inconsistent between SRP Sections 2.4.13 and 11.2 and BTP 11-6 to SRP Section 11.2
 - Guidance difficult to implement based on experience with reviews of COL applications
 - Clarify technical guidance and regulatory requirements in applying SRP Section 11.2 with BTP 11-6 and SRP Section 2.4.13 for the review of associated FSAR sections

- ISG Purpose
 - Provide guidance to staff and applicants in structuring the analyses of accidental releases from radioactive liquid waste tanks to groundwater or surface water, and
 - Provide clarification in assessing compliance with regulatory requirements and SRP acceptance criteria

Introduction (2/2)

- **Regulatory Basis**
 - 10 CFR 52.79 , as it relates to equipment used to control releases
 - 10 CFR 50.34a , as it relates to equipment used to control releases
 - 10 CFR 50.36a, as it relates to technical specifications
 - GCD 60 and 61 (Part 50, App. A), as they relate to the control of releases
 - 10 CFR 100.20 (c)(3), as it relates to hydrological transport of radioactivity

- **Regulatory Guidance**
 - SRP Section 11.2 & BTP 11-6 for release scenario and source term
 - SRP Sections 2.4.12 & 2.4.13 for ground water flow and transport
 - RG 1.206 Sections 11.2, 2.4.12, & 2.4.13, as guidance to COL applicants
 - RG 1.143, as it relates to the design features of LWMS
 - RG 1.113 and NUREG/CR-3332, as they relate to modeling aquatic dispersion

- **SRP 11.2 and BTP 11-6 Acceptance Criteria Adopted from:**
 - 10 CFR Part 20, App. B , Table 2, Col, 2 effluent concentration limits, *or*
 - 10 CFR Part 20 limit of 100 mrem for non-drinking water pathways

Issues & Basis for Update

- Poorly integrated guidance between SRP Section 11.2 (with BTP 11-6) and SRP Section 2.4.13 (plant design features vs actual site features)
- Inconsistent set of SRP acceptance criteria (Part 100.20, Part 20, BTP 11-6) among SRP sections, and description of conditions that envelope site characteristics (conservative vs average conditions)
- Inconsistent guidance in the use of mitigating design features in mitigating radiological impacts (passive and durable features)
- Expand guidance on selection of tanks, failure mechanisms, radiological source terms [nuclides C-14, Ni-63, Sr-90, Tc-99, I-129, Cs-137) and tank selection)], and factors affecting radionuclide transport (enhanced mobility)
- Expand guidance in modeling surface or ground water transport processes from the point of release to dose receptor, including retardation, dispersion, and dilution mechanisms starting with simple models and progressing to more complex ones
- Provide guidance in defining ground and surface water release pathways, exposure pathways, and dose receptors (drinking vs non-drinking pathways)

Proposed Interim Guidance (1/3)

- ❑ Proposed ISG-013 expands and revises:
 - Failure mechanisms and radioactivity releases
 - Technical justification for the postulated failure
 - Consideration for indoor and outdoor tanks
 - Ranking of tanks, low-volume & high-activity vs high-volume & low-activity
 - Prompt vs delayed impacts (releases to surface or ground water bodies)
 - Mitigating design features
 - Use of steel liners, retention basins, dikes, etc.
 - Capability to retain entire volume
 - Capability to pump liquid to other tanks
 - Passive and durable design features
 - Radioactive source term
 - Basis of selected system and tank liquid inventory
 - Radionuclide distribution and concentrations of failed tank
 - Short and long-lived radionuclides vs surface or ground water releases
 - Long-lived and environmentally mobile nuclides (C-14, Tc-99, Sr-90, I-129, Cs-137)



Proposed Interim Guidance (2/3)

- ❑ Proposed ISG-013 expands and revises:
 - Radioactivity transport in ground or surface water
 - Release scenario and assumed conservatism (adverse conditions)
 - Influence of plant structures and facilities on direction and travel path
 - Presence of agents at operating sites that would enhance mobility
 - Transport and dispersion mechanisms of radioactivity to offsite receptors
 - Impact of site conditions, water withdrawal rates, drought conditions, etc.
 - Exposure scenarios and acceptance criteria
 - Direct pathways, surface water body or well water consumption
 - Indirect pathways, fish, invertebrates, crop irrigation, livestock
 - Reliance on local or regional information and land-use census
 - SRP acceptance criteria taken from Part 20 , App. B ,Table 2, Col.2 ECLs, and Part 20.1301 dose limit to members of the public

Proposed Interim Guidance (3/3)

- ❑ Proposed ISG-013 expands and revises:
 - Specifications on tank radioactivity concentration levels
 - Staff to confirm that proposed technical specification limiting radioactivity levels in tanks is consistent with analysis
 - Staff to confirm that FSAR Chapter 16 addresses this commitment in the COL
 - Staff to confirm that the technical specification is supported by the implementation of operational programs and procedures
 - Evaluation findings for combined license reviews
 - Staff evaluation findings revised to reflect expanded guidance
 - Evaluation findings updated to address requirements of Part 100.20 (c)
 - Evaluation findings revised to differentiate between acceptance criteria (drinking vs non-drinking water pathways)
 - Evaluation findings updated to address mitigating design features

Area of Review, Interface

- **SRP 11.2/BTP 11-6 Interface with Other SRP Sections:**
 - SRP 2.4.12, as it relates to the characterization of ground water
 - SRP 2.4.13, as it relates accidental releases of radioactivity in ground and surface water
 - SRP 3.2.1 and 3.2.2, as they relate to seismic and system quality group classifications of LWMS SSC
 - SRP 9.3, as its relates to plant systems and component interfaces with the LWMS
 - SRP 16, as it relates to specifying maximum concentration levels in tanks
 - SRP 13.4, as it relates to the development and implementation of operational programs in avoiding uncontrolled and unmonitored radioactive releases

Resolution and Applicability

- **Final Resolution:**
 - Review and evaluation of ACRS, public, and industry comments on ISG-013 and ISG-014
 - Finalization of ISG-013 and ISG-014 with incorporation of ACRS, public, and industry comments
 - Update SRP Section 11.2 and BTP 11-6 given final issuance of ISG-013 and ISG-014 (as directed by NRO in updating infrastructure documents)
- **Applicability to Part 52 COL Applicants:**
 - Revised guidance will be applicable to all COL/ESP license applications submitted after the formal issuance ISG-013 and ISG-014

QUESTIONS ?

Document Citations

- SRP 2.4.12, Ground water
- SRP 2.4.13, Accidental releases of radioactive liquid effluents in ground and surface waters
- SRP 3.2.1, Seismic classification
- SRP 3.2.2, System quality group classification
- SRP 9.3, Process auxiliaries
- SRP 11.2, Liquid waste management system
- BTP 11-6, Postulated radioactive releases due to liquid-containing tank failures
- SRP 13.4, Operational programs
- SRP 16, Technical specifications
- RG 1.113, Estimating aquatic dispersion of effluents from accidental and routine reactor releases for the purpose of implementing Appendix I
- RG 1.143, Design guidance for radioactive waste management systems, structures and components installed in light-water-cooled nuclear reactor power plants
- NUREG/CR-3332, Radiological risk assessment
- Part 50, App. A, GDC 60, Control of releases of radioactive materials to the environment
- Part 50, App. A, GDC 61, Fuel storage and handling and radioactivity control
- Part 100.20, Factors to be considered when evaluating sites
- Part 50.34a, Design objectives for equipment to control releases of radioactive material in effluents – nuclear power reactors
- Part 50.36a, Technical specifications on effluents from nuclear power reactors
- Part 20, Standards for protection against radiation
- Part 52, Subpart C - Combined licenses, Part 52.79, Contents of applications; technical information in final safety analysis report